Complete Summary

GUIDELINE TITLE

Suspected lower urinary tract trauma.

BIBLIOGRAPHIC SOURCE(S)

Sandler CM, Francis IR, Baumgarten DA, Bluth EI, Bush WH Jr, Casalino DD, Curry NS, Israel GM, Jafri SZ, Kawashima A, Papanicolaou N, Remer EM, Spring DB, Fulgham P, Expert Panel on Urologic Imaging. Suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2007. 7 p. [39 references]

GUIDELINE STATUS

This is the current release of the guideline.

It updates a previously published version: Sandler CM, Choyke PL, Bluth EI, Bush WH, Casalino DD, Francis IR, Jafri ZH, Kawashima A, Papanicolaou N, Rosenfield AT, Segal AJ, Tempany C, Resnick MI, Expert Panel on Urologic Imaging. Suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2005. 8 p. [38 references]

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Suspected lower urinary tract trauma

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Emergency Medicine
Nuclear Medicine
Radiology
Urology

INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of radiologic procedures for patients with suspected lower urinary tract trauma

TARGET POPULATION

Patients with suspected lower urinary tract trauma

INTERVENTIONS AND PRACTICES CONSIDERED

1. X-ray
    - Retrograde cystogram
    - Retrograde urethrogram
    - Abdomen
    - Intravenous urography
2. Computed tomography (CT)
    - Cystography
    - Bladder with contrast
3. Invasive (INV) angiography, bladder
4. Ultrasound (US), bladder and urethra
    - Transabdominal
    - Transrectal
    - Transurethral
5. Nuclear medicine (NUC) scintigraphy, lower urinary tract
6. Magnetic resonance imaging (MRI), bladder and urethra

MAJOR OUTCOMES CONSIDERED

Utility of radiologic procedures in evaluation of suspected lower urinary tract trauma

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals, and the major applicable articles were identified and collected.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed for reaching agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed

by the participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1 to 9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by this Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

ACR Appropriateness Criteria®

Clinical Condition: Suspected Lower Urinary Tract Trauma

Variant 1: Penetrating trauma, lower abdomen/pelvis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray retrograde cystogram	8		Med
CT cystography	8	CT cystogram and retrograde	High

Radiologic Procedure	Rating	Comments	RRL*
		cystogram are equivalent. If doing CT, do CT cystogram.	
CT bladder with contrast	5	Routine enhanced CT by itself is inadequate to evaluate lower urinary tract for trauma. If needed to evaluate extraurinary pelvic organs.	High
X-ray abdomen	5	If any question of foreign body (e.g., bullet)	Low
INV angiography bladder	3	For persistent bleeding preliminary to embolotherapy.	IP
X-ray intravenous urography	2	Inadequate for lower urinary tract trauma.	Low
X-ray retrograde urethrogram	2	Unless suspected urethral injury (e.g., trajectory of knife or bullet)	Med
US bladder and urethra transabdominal	2	Ultrasound is usually not definitive.	None
MRI bladder and urethra	1	Not applicable to acute trauma.	None
US bladder and urethra transurethral	1	Ultrasound is usually not definitive	None
NUC scintigraphy lower urinary tract	1	Not applicable to acute trauma.	Med
US bladder and urethra transrectal	1	Ultrasound is usually not definitive.	None
Rating Scale: 1=Least appropriate, 9=Most appropriate			***Relative Radiation Level**

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

Variant 2: Blunt trauma, lower abdomen/pelvis.

Radiologic Procedure	Rating	Comments	RRL*
X-ray abdomen	9		Low

Radiologic Procedure	Rating	Comments	RRL*
X-ray cystography	8		Med
CT cystography	8	CT cystogram and retrograde cystogram are equivalent. If doing CT, do CT cystogram.	High
X-ray retrograde urethrogram	5	Necessary if pelvic fracture present.	Med
CT bladder with contrast	5	Routine enhanced CT by itself is inadequate to evaluate lower urinary tract for trauma. If needed to evaluate extraurinary pelvic organs.	High
INV angiography bladder	3	For persistent bleeding preliminary to embolotherapy.	IP
X-ray intravenous urography	3	Inadequate for lower urinary tract trauma.	Low
US bladder and urethra transabdominal	2	Ultrasound is usually not definitive.	None
US bladder and urethra transrectal	1	Ultrasound is usually not definitive.	None
NUC scintigraphy lower urinary tract	1	Not applicable to acute trauma.	Med
MRI bladder and urethra	1	Not applicable to acute trauma.	None
US bladder and urethra transurethral	1	Ultrasound is usually not definitive.	None
Rating Scale: 1=Least appropriate, 9=Most appropriate			***Relative Radiation Level**

Variant 3: Blunt perineal trauma in the male (straddle injury).

Radiologic Procedure	Rating	Comments	RRL*
X-ray retrograde urethrogram	9		Med
X-ray abdomen	5	Necessary if strong suspicion of pelvic	Low

Radiologic Procedure	Rating	Comments	RRL*
		fracture present.	
CT bladder with contrast	2	To look for hematoma.	High
CT cystography	1		High
X-ray intravenous urography	1	Inadequate for lower urinary tract trauma.	Low
MRI bladder and urethra	1	Not applicable to acute trauma.	None
INV angiography bladder	1	For persistent bleeding preliminary to embolotherapy.	IP
US bladder and urethra transabdominal	1	Transabdominal ultrasound not definitive.	None
US bladder and urethra transurethral	1	Transurethral ultrasound traumatic.	None
NUC scintigraphy lower urinary tract	1	Not applicable to acute trauma.	Med
X-ray retrograde cystogram	1		Med
US bladder and urethra transrectal	1	Transrectal ultrasound painful.	None
Rating Scale: 1=Least appropriate, 9=Most appropriate			***Relative Radiation Level**

Summary of Literature Review

Lower urinary tract injury may be from blunt, penetrating, or iatrogenic trauma. About 10% of all trauma patients will manifest genitourinary tract involvement. About 70% of patients with bladder injuries from blunt trauma have associated pelvic fractures, with an average of 2.9 other injuries in multiple organ systems. Approximately 30% of patients with pelvic fractures will have some bladder injury, including bladder contusion. Major bladder injury occurs in about 10% of patients suffering from an anterior arch pelvic fracture. However, 25% of intraperitoneal bladder ruptures occur in patients without pelvic fracture. Simultaneous bladder ruptures from external trauma occur in 10% to 29% of male patients with traumatic rupture of the prostatomembranous urethra, with an average of 3.1 associated injuries per patient.

The degree of distension of the bladder with urine determines its shape and to some degree the injury it may sustain. An exceedingly light blow may rupture the fully distended bladder, but the empty bladder is seldom injured except by crushing or penetrating wounds. Pelvic scars or pre-existing pelvic pathology modify the situation.

Gross hematuria indicates urologic trauma. Presence of gross blood at the urethral meatus strongly suggests urethral injury. A Foley catheter should not be inserted without first doing a retrograde urethrogram to ensure urethral integrity. While grossly clear urine in a trauma patient without a pelvic fracture virtually eliminates the possibility of a bladder rupture, up to 2% of patients with bladder rupture may have only microhematuria.

Exactly how much blood in the urine necessitates investigation is a point of controversy in the literature. One study concluded that if cystography were restricted only to patients with more than 35 to 50 red blood cells/high power field (rbc/hpf), no perforation would have been missed in their series. Another group of researchers believes that cystography in blunt trauma should be restricted to those patients with gross hematuria, which they define as more than 200 rbc/hpf. They also feel that a retrograde urethrogram should be done first in males with a pelvic fracture. Another study concluded that since 90% of patients in their series of 103 patients with pelvic fracture did not have a bladder rupture, cystography may be safely reserved for those patients with pelvic fracture who are considered to be at high risk for such an injury. They limit cystography in pelvic fracture to patients with significant pubic arch involvement, gross hematuria, and/or hemodynamic instability.

Bladder Injury

Type I	Bladder contusion.
Type II	Intraperitoneal rupture.
Type III	Extraperitoneal rupture.
Type IV	Combined injury.

Bladder contusion (Type I) represents an incomplete tear of the bladder mucosa following blunt injury. The results of cystography are normal. The diagnosis of bladder contusion is usually established by exclusion in patients with hematuria following blunt pelvic trauma for which no other cause is found. While bladder contusion is generally regarded as the most common form of bladder injury following blunt trauma, it is not considered to be a major injury.

Intraperitoneal rupture (Type II) occurs when there is a sudden rise in intravesicle pressure as a result of a blow to the lower abdomen in a patient with a distended bladder. The increased intravesicle pressure results in rupture of the weakest portion of the bladder, the dome, where the bladder is in contact with the peritoneal surface. Intraperitoneal rupture accounts for approximately one-third of major bladder injuries. Approximately 25% of such injuries occur in patients without pelvic fracture. On cystography, contrast material extravasation into the paracolic gutters and outlining loops of small bowel will be present.

The classically described mechanism for *extraperitoneal bladder rupture* (Type III) is laceration of the bladder by a bone spicule in association with an anterior pelvic arch fracture. Recent data, however, have shown that cystograms in such patients often demonstrate that the site of contrast material extravasation is far removed from the site of fracture, and thus the validity of this mechanism has been questioned.

Extraperitoneal rupture represents approximately 60% of major bladder injuries. One group of investigators further subdivided extraperitoneal rupture into two groups. With *simple* extraperitoneal rupture, contrast extravasation is limited to the pelvic extraperitoneal space. With *complex* extraperitoneal rupture, contrast material extravasation may extend into the anterior abdominal wall, the penis, the scrotum, and the perineum. The presence of a complex extraperitoneal injury implies that the fascial boundaries of the pelvis have been disrupted by the injury. Such findings should not be mistaken as evidence of a coexisting urethral injury.

Combined bladder injury (Type IV) results when both intraperitoneal and extraperitoneal bladder injuries are present. This happens in approximately 5% of major bladder injuries.

Urethral Injury

Injuries to the male urethra can be classified into two main categories according to their mechanism of injury: 1) those associated with a fracture of the anterior pelvic arch (usually involving the membranous urethra), and 2) those occurring as the result of a straddle injury (usually involving the bulbous urethra). Any female urethral injury is rare and usually associated with pelvic disruption and/or vaginal laceration.

Some form of urethral injury occurs in about 5% of men who sustain a pelvic fracture when the prostate is sheared from its connection to the urogenital diaphragm as the puboprostatic ligaments are ruptured. The urethral injury is due to disruption of the soft tissues, rather than to a laceration by a bony spicule. A hematoma forms in the retropubic and perivesical spaces.

Straddle injuries occur as the result of a direct blow to the perineum when the urethra and corpus spongiosa are compressed between a hard object and the inferior aspect of the symphysis pubis. In most cases there is no pelvic fracture. Straddle injuries result in either partial or complete rupture of the bulbous urethra.

Male urethral trauma has been classified by Colapinto and McCallum based on the appearance of the retrograde urethrogram. This classification has been expanded to include all urethral trauma.

Urethral Injury Associated with Pelvic Fracture

Type I	Posterior urethra stretched but intact.
Type II	Urethra disrupted at the membranoprostatic junction above the urogenital diaphragm.
Type	Membranous urethra disrupted, with extension to proximal bulbous urethra

III	and/or disruption of the urogenital diaphragm (most common).
Type IV	Bladder neck injury with extension into the urethra.
Type IVa	Injury of the base of the bladder with periurethral extravasation simulating a true Type IV urethral injury.
Type V	Partial or complete pure anterior urethral injury.

Urethrography has improved the understanding of the mechanism of such injuries. In the past, the diagnosis of acute urethral injury often was based loosely on the clinical triad of 1) blood at the urethral meatus, 2) inability of the patient to void, and 3) a palpable urinary bladder. An inability to pass the catheter into the bladder also was considered diagnostic of a posterior urethral injury. It is now well established, however, that diagnostic catheterization is to be condemned since this procedure may convert a partial injury into a complete one. Because posterior urethral injuries are also seen with pelvic fractures, a retrograde urethrogram should be performed before inserting a catheter. Lack of pelvic and suprapubic tenderness; absence of penile, scrotal, or perineal hematoma; and a normal rectal examination support the integrity of the urethra.

Retrograde Urethrography

One study describes the widespread acceptance of retrograde urethrography (RUG) as the primary diagnostic procedure in patients suspected of having urethral injury.

Cystography

The diagnosis of bladder rupture is usually made easily on cystography when the injected contrast is identified outside the bladder. Retrograde cystography in evaluation of bladder trauma is called "procedure of choice," "mandatory," "the only way," "examination of choice," "keystone," "mainstay," and "absolute indication."

Adequate distention of the urinary bladder is crucial to finding a perforation, especially in instances of penetrating trauma, since most instances of a false negative retrograde cystogram were found in this situation.

Cystography requires plain film, filled film, and post-drainage films at a minimum. Half-filled film and obliques are optional. Bladder injury may be identified only on the post-drainage film in approximately 10% of cases. Cystography has an accuracy rate of 85% to 100% for detecting bladder injury. Only a properly performed cystogram should be used to exclude bladder injury.

Excretory Urography (Intravenous Pyelogram)

An intravenous pyelogram (IVP) is inadequate for evaluating the bladder and urethra after trauma because of dilution of the contrast material within the bladder and because resting intravesical pressure is simply too low to demonstrate a small tear. IVP has a low accuracy on the order of 15% to 25%. In only 5 of 23 patients (22%) studied was the diagnosis of bladder rupture made

with IVP. One study found only 5 of 32 (16%), and another study found only 4 of 11 (36%).

Ultrasound

Transabdominal US findings in bladder rupture and urethral evaluation with endorectal probe have been described, but US has not been routinely used for evaluating the trauma patient. It is unlikely that a patient with significant posterior urethral or bladder rupture would tolerate evaluation with an endorectal probe. On the other hand, most or all serious trauma patients will likely be evaluated with CT because of the speed and accuracy of evaluation.

US can exclude associated visceral lesions such as solid or hollow organ rupture and nonspecific peritoneal fluid. The detection of peritoneal fluid in the presence of normal viscera or failure to visualize the bladder after the transurethral introduction of saline is considered highly suggestive of bladder rupture. As a practical matter, US is not definitive in bladder or urethral trauma and is almost never used.

Computed Tomography

CT cystography refers to the retrograde instillation of a minimum of 300-350 cc of diluted contrast media into the bladder followed by axial CT images of the pelvis. One study reported sensitivities of 95% overall but only 78% for intraperitoneal rupture. Routine CT, using excreted contrast only, cannot be relied upon entirely to diagnose bladder rupture even with a urethral catheter inserted and clamped. CT performed with excreted contrast only may demonstrate intraperitoneal or extraperitoneal fluid but cannot differentiate urine from ascites. The absence of pelvic ascites is strong evidence against bladder rupture. As with IVP, the bladder is usually inadequately distended to cause extravasation through a bladder laceration or perforation during routine abdominal and pelvic studies. A negative study cannot be entirely trusted.

One study reviewed the cystograms and CT examinations of 25 patients who had both studies as the initial evaluation of blunt abdominal trauma. Five of them had bladder rupture, three extraperitoneal and two intraperitoneal. All injuries were detected by both studies. The authors felt that delayed imaging or contrast instillation can provide the adequate bladder distention needed to demonstrate contrast extravasation from the injury site during CT. They continue to perform cystography in patients with compelling evidence of bladder injury but no extravasation demonstrated on CT. Another study stated that either retrograde cystography or CT is the diagnostic procedure of choice for suspected bladder injury.

The literature suggests that conventional and CT cystography are equivalent, with physician preference and diagnostic protocols generally defining which is used. Although CT is not the technique of choice for urethral injuries, it is performed so frequently that urethral injuries are inevitably identified on CT performed for pelvic trauma. Findings can include displacement of the prostate and bladder, extravasation of contrast media, and hematomas.

Angiography

Angiography can be useful in identifying an occult source of bleeding and can guide its subsequent therapeutic embolization.

Nuclear Imaging

Because of its low resolution, nuclear imaging has not been applied to lower urinary tract injuries.

Magnetic Resonance Imaging

Because of the difficulty of monitoring a seriously injured patient in a strong magnetic field, magnetic resonance imaging (MRI) currently has little place in the evaluation of acute bladder and/or urethral trauma. Use of MRI has been described for later evaluation of urethral injury.

Abbreviation

- CT, computed tomography
- IP, in progress
- INV, invasive
- Med, medium
- MRI, magnetic resonance imaging
- NUC, nuclear medicine
- US, ultrasound

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Selection of appropriate radiologic imaging procedures for evaluation of patients with suspected lower urinary tract trauma

POTENTIAL HARMS

- Transrectal ultrasound (US) of the bladder and urethra is painful.
- The relative radiation level is high for computed tomography (CT) cystography and CT of the bladder with contrast; medium for x-ray retrograde cystogram, x-ray retrograde urethrogram, and nuclear medicine

(NUC) scintigraphy of the lower urinary tract; and low for x-ray of the abdomen and x-ray intravenous urography.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Sandler CM, Francis IR, Baumgarten DA, Bluth EI, Bush WH Jr, Casalino DD, Curry NS, Israel GM, Jafri SZ, Kawashima A, Papanicolaou N, Remer EM, Spring DB, Fulgham P, Expert Panel on Urologic Imaging. Suspected lower urinary tract trauma. [online publication]. Reston (VA): American College of Radiology (ACR); 2007. 7 p. [39 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1996 (revised 2007 Jan)

GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Urologic Imaging

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Carl M. Sandler, MD; Isaac R. Francis, MD; Deborah A. Baumgarten, MD, MPH; Edward I. Bluth, MD; William H. Bush, Jr., MD; David D. Casalino, MD; Nancy S. Curry, MD; Gary M. Israel, MD; S. Zafar H. Jafri, MD; Akira Kawashima, MD; Nicholas Papanicolaou, MD; Erick M. Remer, MD; David B. Spring, MD; Pat Fulgham, MD

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

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GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

ACR Appropriateness Criteria® *Anytime*, *Anywhere*™ (PDA application). Available from the ACR Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.
- ACR Appropriateness Criteria®. Relative radiation level information. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI on February 13, 2006. This NGC summary was updated by ECRI Institute on December 6, 2007.

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Date Modified: 9/22/2008